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10/510,898	05/25/2005	Mark Thompson	10020/25102	3784

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EXAMINER	
YAMNITZKY, MARIE ROSE	
ART UNIT	PAPER NUMBER
1794	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/510,898	THOMPSON, MARK	
	Examiner	Art Unit	
	Marie R. Yamnitzky	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 November 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-102* is/are pending in the application.

4a) Of the above claim(s) *See Continuation Sheet* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,5-17,29,31-33,35-38,40,46-56,78-84,86,87,89,92-94,96,97,99 and 102* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *08 Oct 2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continuation of Disposition of Claims: Claims withdrawn from consideration are 3,4,18-28,30,34,39,41-45,57-77,85,88,90,91,95,98,100 and 101.

1. Applicant's election without traverse of the species wherein (VI) the organometallic dopant comprises at least one arene ligand and is other than a dopant of the formula $M(Ar)_4$, (A) the charge transporting material is an electron transporting material, and (C) the dopant is oxidizable, in the reply filed on November 04, 2008 is acknowledged.

The species described as (I)-(VIII) as set forth in the election of species (lack of unity) requirement mailed September 04, 2008 were intended to reflect patentably distinct species of organometallic dopants. However, in considering applicant's listing of claims that read on the elected species, and in performing a prior art search, the examiner recognizes that there is overlap between (II) and (VI), and overlap between (V) and (VI), as set forth in the requirement.

Claims 1, 2, 5-17, 29, 31-33, 35-38, 40, 46-56, 83, 84, 86, 87, 89, 93, 94, 96, 97 and 99 read on the elected species.

In the reply filed November 04, 2008, applicant also listed claims 78-82, 92 and 102 as reading on the elected species. There is insufficient information of record to determine whether these claims actually encompass the elected species. It is the examiner's position that the subject matter of these claims is not enabled. Claims 78-82, 92 and 102 have been examined only for issues under 35 U.S.C. 112.

2. In the reply filed November 04, 2008, applicant also listed claims 41-45, 88 and 98 as reading on the elected species. These claims require at least one carborane ligand, and there is no information of record indicating that a carborane ligand would also be considered to be an arene ligand. Accordingly, claims 41-45, 88 and 98 do not read on the elected species.

3. Claims 3, 4, 18-28, 30, 34, 39, 41-45, 57-77, 85, 88, 90, 91, 95, 98, 100 and 101 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on November 04, 2008.

4. Claims 78-82, 92 and 102 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The only description pertaining to the charge transporting material of claims 78-82, with claim 92 drawn to a device comprising the material and claim 102 drawn to a method in which the material is used to make a device, is in paragraphs [0071]-[0072] on page 23 of the specification. These paragraphs provide little information beyond what is stated in claims 78-82. While paragraph [0072] indicates that organometallic compounds of Ir, Re, Os, Pt or Au may be used as optically activated dopants, it is not clear whether all organometallic compounds of any of these metals would meet the limitations of the organometallic dopant required, for example, by independent claim 78. It is not clear if Ir, Re, Os, Pt and Au are the only metals suitable for optically activated organometallic dopants. It is also not clear what ligands may be used to make optically activated organometallic dopants. Paragraphs [0071]-[0072] do not disclose any specific ligands suitable for optically active dopants. It is not clear if all of the ligands described

in reference to other embodiments are also suitable for making the optically activated organometallic dopants.

5. Regarding claim interpretation:

As taught in paragraph [0043] of the present specification, the term "organometallic" requires at least one carbon-metal bond.

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1, 2, 5, 6, 12 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Kim (US 4,618,453).

Kim teaches that the conductivity of a conductive polymer is increased by doping with an alkali metal complex. Claim 12 of the patent provides a polymer doped with n-butyl Li. The dopant n-butyl Li is an organometallic dopant. The polymer doped with n-butyl Li meets the limitations of a charge transporting material according to at least present claims 1, 2, 5, 6, 12 and 15.

8. Claims 1, 2, 6, 11, 31-33, 35-38, 40, 46-48, 50, 51 and 56 are rejected under 35 U.S.C. 102(b) as being anticipated by Lim (US 4,066,569).

Lim teaches compositions doped with metallocenes such as ferrocenes, which may be substituted. For example, see column 3, lines 4-29 and the claims. Lim's compositions meet the limitations of a charge transporting material according to at least present claims 1, 2, 6, 11, 31-33, 35-38, 40, 46-48, 50, 51 and 56.

9. Claims 1, 2, 5, 6, 8-10, 29, 31-33, 36-38, 83, 84, 86, 87, 93, 94, 96 and 97 are rejected under 35 U.S.C. 102(b) as being anticipated by Kido et al. (EP 1 011 155 A2).

Kido et al. disclose an organic electroluminescent (EL) device comprising an electron injecting/transporting layer that is a mixed layer made of an electron transporting organic compound and an organic metal complex (e.g. see the abstract and paragraph [0011]-[0012] and [0019]-[0020]). The organic metal complex contains at least one of alkali metal ions, alkali earth metal ions and rare earth metal ions and, as taught in paragraph [0020], the ligand of the metal complex compound may be cyclopentadiene. A mixed layer according to Kido's disclosure wherein the ligand of the organic metal complex is cyclopentadiene meets the limitations of a charge transporting material as claimed in present claims 1, 2, 5, 6, 9, 10, 31, 33, 36 and 38, and Kido's disclosure of using such a material to make an EL device anticipates the device of claims 83, 84, 86, 87, and the method of claims 93, 94, 96 and 97.

With respect to claims 8 and 29, since the prior art mixed layer is used as an electron injecting/transporting layer, and a purpose of providing the mixed layer is to reduce the electron

injection energy barrier, it is the examiner's position that it is reasonable to expect that the prior art mixed layer inherently meets the limitations of claims 8 and 29.

With respect to claims 32 and 37, Kido et al. teach that the metal ions of the organic metal complex may be rare earth metal ions. Rare earth metals are transition metals.

10. Claims 1, 2, 5, 6, 9-13, 15, 31-33, 36-38, 46-48, 54-56, 83, 84, 86, 87, 89, 93, 94, 96, 97 and 99 are rejected under 35 U.S.C. 102(b) as being anticipated by Hsieh (US 5,853,906).

Hsieh discloses a conductive coating composition comprising a charge transport component, a polymer binder, and an oxidized oligomer salt. The conductive coating composition may be used in an electroluminescent device (e.g. see column 2, lines 49-54 and claim 7). The oxidized oligomer salt may be an oxidized oligo-metallocene salt as described at c. 25, l. 23-43. This metallocene compound meets the limitations of the organometallic dopant required by the rejected claims. In particular, with respect to claims 46-48 and 54-56, the metallocene is a dopant having the formula set forth in claim 46 wherein M is a transition metal per claim 47, M is Fe or Co per claim 48, and the two cyclopentadiene rings (L^1 and L^2) are covalently linked by alkyl (wherein Z of the prior art formula is methylene or ethylene), aryl (when Z is phenylene) or silyl (when Z is either of the Si-containing linking groups).

The metallocene compound is taught for use in combination with materials within the scope of present claims 12, 13 and 15 (e.g. see c. 25, l. 46-c. 27, l. 60).

Amounts of metallocene within the range set forth in present claim 10 are provided by the weight percent ratios set forth at c. 27, l. 60-65.

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 7, 8, 11-15, 29, 32 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kido et al. (EP 1 011 155 A2) as applied to claims 1, 2, 5, 6, 8-10, 29, 31-33, 36-38, 83, 84, 86, 87, 93, 94, 96 and 97 above, and for the further reasons set forth below.

With respect to claim 7, 8 and 29, since the prior art mixed layer is used as an electron injecting/transporting layer, and a purpose of providing the mixed layer is to reduce the electron injection energy barrier, it is the examiner's position that it is reasonable to expect that the prior art mixed layer inherently meets the limitations of claims 8 and 29, though not necessarily claim 7. However, even if every possible combination of electron transporting material mixed with an organic metal complex comprising a cyclopentadiene ligand does not meet the limitation of the organic metal complex having an ionization potential lower than the LUMO energy level of the electron transporting material, it would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to select combinations of materials having appropriate ionization potentials and LUMO levels to achieve the purposes of the prior art.

With respect to claim 11, Kido et al. do not expressly limit the amount of organic metal complex relative to the amount of electron transporting material. It would have been within the level of ordinary skill of a worker in the art at the time of the invention to determine suitable and

optimum amounts of organic metal complex to be included in the mixed layer in order to reduce the electron injection energy barrier to a suitable and/or optimum level.

With respect to claims 12-15, materials within the scope of present claims 12-14 are explicitly disclosed as suitable for use as the electron transporting compound in the mixed layer (e.g. see paragraphs [0026]-[0027]), and electron-transporting polymers were known in the art at the time of the invention. In Kido's examples, aluminum tris(8-hydroxyquinoline), as recited in claim 14, is used as the electron transporting material. It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to use a cyclopentadiene-containing metal complex in combination with the electron transporting materials explicitly taught by Kido et al. or in combination with other known electron transporting materials in order to achieve the desired results. One of ordinary skill in the art at the time of the invention would have selected a particular electron transporting material based on factors such as identity of the material used in the adjacent light emitting layer as one of ordinary skill would recognize that device performance is also affected by the interaction between these two layers.

13. Claims 35 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kido et al. (EP 1 011 155 A2) as applied to claims 1, 2, 5, 6, 8-10, 29, 31-33, 36-38, 83, 84, 86, 87, 93, 94, 96 and 97 above, and further in view of Thompson (US 5,811,833).

Thompson teaches substituted cyclopentadienyl compounds for use in the electron transporting layer of an organic EL device. The substituents are alkyl (electron donating

substituents per the present specification) and/or aryl (electron withdrawing substituents per the present specification).

Given Thompson's disclosure that cyclopentadienyl compounds having alkyl and/or aryl substituents may be used in an electron transporting layer of an organic EL device, it would have been an obvious modification to one of ordinary skill in the art at the time of the invention to use alkyl- and/or aryl-substituted cyclopentadiene as a ligand for the organic metal complex included in the electron injecting/transporting (mixed) layer of Kido's organic EL device.

14. Claims 7, 8, 14, 29, 35, 40 and 49-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsieh (US 5,853,906) as applied to claims 1, 2, 5, 6, 9-13, 15, 31-33, 36-38, 46-48, 54-56, 83, 84, 86, 87, 89, 93, 94, 96, 97 and 99 above, and for the further reasons set forth below.

With respect to claims 7, 8 and 29, Hsieh does not limit the ionization potential of the metallocene relative to the LUMO energy level of the materials with which the metallocene is mixed, but it would have been within the level of ordinary skill of a worker in the art at the time of the invention to select appropriate combinations of materials to provide a conductive composition. One of ordinary skill in the art would have been guided in the selection of materials based on the intended end use of the conductive composition.

With respect to claim 14, Hsieh does not explicitly teach any of the specific materials recited in claim 14, but does teach carbazole compounds (c. 25, l. 48). The third material named in claim 14 is a charge-transporting carbazole compound that was known in the art at the time of

the invention. It would have been within the level of ordinary skill of a worker in the art at the time of the invention to utilize known charge-transporting compounds within Hsieh's guidelines.

With respect to claims 35, 40 and 49-53, absent a showing of superior/unexpected results commensurate in scope with the claims, it is the examiner's position that it would have been an obvious modification to one of ordinary skill in the art at the time of the invention to use substituted derivatives of metallocenes disclosed by Hsieh. It would have been within the level of ordinary skill of a worker in the art at the time of the invention to determine suitable substituents to provide conductive compositions similar to those provided by the metallocenes disclosed by Hsieh.

15. Claims 1, 2, 6, 12, 15-17, 36-38 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Swager (US 7,186,355 B2).

Swager discloses conducting polymers having metallocenes incorporated into the main chain of the polymer. Given the conducting polymer structure in claim 1 of the patent, polyphenylenevinylenes having an organometallic dopant covalently attached to the polymer would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention. Such polymers are within the scope of the formula in patent claim 1 wherein L is a π-arene ligand, A and/or C is a phenylene group (which would *prima facie* given the rest of Swager's disclosure). Although claim 1 does not depict double bonds between the carbons in -CC-M-CC- (as would be required for vinylene), polymers having double bonds between the carbons would have been obvious to one of ordinary skill in the art given the requirement that

the polymer be conductive and given Swager's teachings such as at column 5, lines 38-59 (especially line 54, where "poly(arylene vinylene)" is taught).

With respect to claim 17's requirement that the polyphenylenevinylene be cyano-substituted, and claim 40's requirement that the arene ligand be substituted, it would have been within the level of ordinary skill of a worker in the art at the time of the invention to determine suitable substituted derivatives capable of being used for the purposes of Swager's conducting polymers.

16. Miscellaneous:

In claim 13, "oxidiazoles" should read --oxadiazoles--.

In claims 14 and 17, "oxidiazole" should read --oxadiazole--.

In claim 17, the last word should read --polymer--.

17. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 7:00 a.m. to 3:30 p.m. Monday-Friday.

The current fax number for all official faxes is (571) 273-8300. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

/Marie R. Yamnitzky/
Primary Examiner, Art Unit 1794

MRY
February 17, 2009